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Pesticide Fact Sheet Number 87: Copper Sulfate

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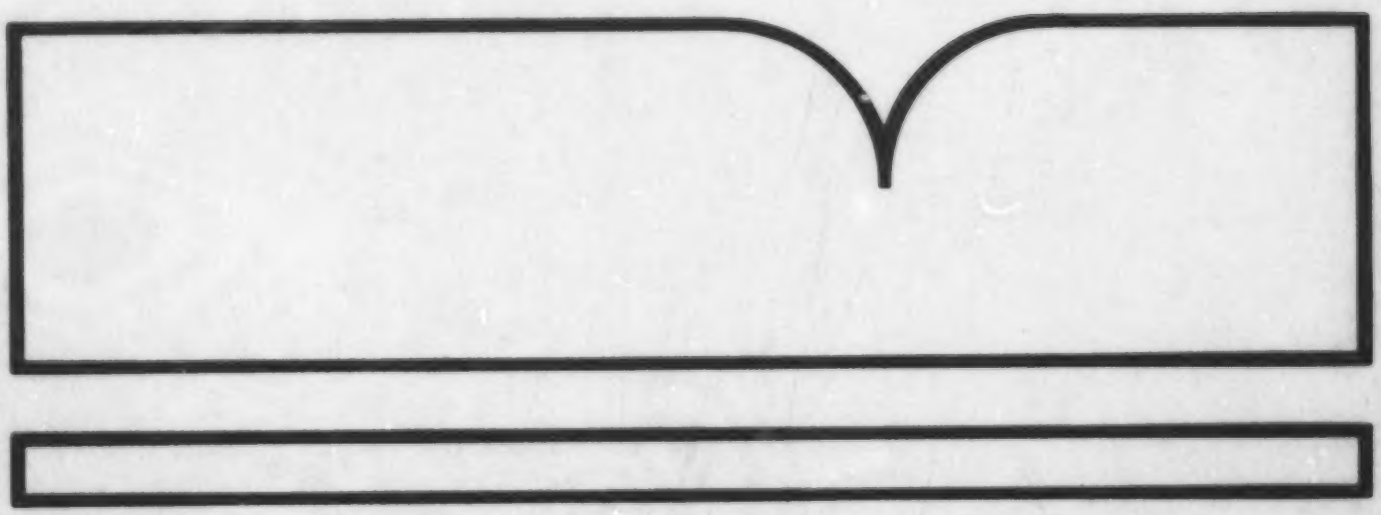

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, Science Findings

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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Office of Pesticides and Toxic Substances
Office of Pesticide Programs (TS-766C)
Washington, DC 20460

EPA

Pesticide Fact Sheet

Name of Chemical: COPPER SULFATE
Reason for Issuance:
Date Issued: March 21, 1986
Fact Sheet Number: 87

1. Description of chemical:

Generic Name: Copper Sulfate
Common name: Copper Sulfate
Trade names: Copper Sulfate, Bluestone
EPA Shaughnessy Code: 024401 (pentahydrate), 024402 (monohydrate), 008101 (basic copper sulfate)
Chemical Abstracts Service (CAS) Number: 1344-73-6
Year of Initial Registration:
Pesticide Type: Herbicide, fungicide
Chemical family: Copper sulfate
U.S. Producers: The Anaconda Co., Cities Service Co., Inc., C.P Chemicals, Inc., Engelhard Minerals & Chemical Corp., Liquid Chemical Corp., Madison Industries, Inc., Mallinckrodt, Inc., Phelps Dodge Corp., Southern California Chemical Co., Inc., Transvaal, Inc., Univar Corp., Gulf Chemical & Metallurgical Co., Pesticide Service Consultants.

2. Use patterns and formulations:

Application sites: Primary use is to control alga growths in impounded waters, lakes, ponds, reservoirs, and irrigation and irrigation drainage conveyance systems. Other sites include foliar applications for control of foliar pathogens on fruit, nut, vegetable, and field crops, ornamentals, and agricultural and home garden uses. Copper sulfate is also registered for use as a weed seed treatment, for treatment of tree wounds, for control of fungi and fungal/bacterial slimes occurring in wood, and in water systems, including sewer pumps and force mains, pulp and paper mills, cooling towers and spray ponds.
Types of formulations: Basic copper sulfate is formulated as crystalline solids, 12.75 and 53.0 percent wettable powders, 30.0 percent liquid concentrate, and 2.0 and 52.0 percent dusts.
Types and Methods of Application: In impounded waters, lakes, ponds, reservoirs and irrigation systems, copper sulfate can be applied by spraying or dusting the water surface, large crystals can be placed in a burlap bag and towed behind a boat, or dumped in directly, or finer crystals can be metered in continuously.
Application Rates: From 0.0013 to 10.0 ppm for aquatic uses and from 0.24 to 21.2 lb a.i./A for terrestrial uses.
Usual carriers: Water, or no carrier.

3. Science Findings:

Summary science statement: Copper sulfate is exempt from the requirements of a tolerance when it is applied to growing crops. There is also a specific exemption from the requirement of a tolerance for copper in meat, milk, poultry, eggs, fish, shellfish, and irrigated crops when copper sulfate pentahydrate is used as an algicide or herbicide in ponds, reservoirs, or other bodies of water. These exemptions are well founded. No additional toxicology studies are required. Copper sulfate is in Toxicity Category I as an eye and dermal irritant. Copper sulfate is toxic to fish and may present a hazard to aquatic organisms, especially when used as an algicide or molluscicide.

Chemical characteristics:

Physical state: Solid, crystalline
Color: Blue-green
Odor: None
Boiling point: N/A
Melting point: N/A
Flash point: N/A
Unusual handling characteristics: None

Toxicological characteristics:

Acute Effects:

Acute Oral Toxicity - Toxicity Category II
Acute Dermal Toxicity - Toxicity Category II
Dermal Irritation - Toxicity Category I
Dermal Sensitization - Copper Sulfate is a dermal sensitizer
Acute Inhalation Toxicity - N/A
Primary Eye Irritation - Toxicity Category I

Chronic Effects:

Oncogenicity - N/A (Data not required)
Teratology - N/A
Reproductive Effects - N/A
Mutagenicity - N/A
Feeding Studies - N/A

Major Routes of Exposure: Dermal, ocular, and inhalation

Physiological and Biochemical Behavioral Characteristics:

Foliar absorption: N/A
Translocation: N/A
Mechanism of pesticidal action: Inactivation of enzyme systems in fungus and algae
Metabolism and persistence in plants and animals: No build-up of copper occurs in plants. Because of the exemption from tolerance requirements, no further data will be required for plant and animal metabolism and persistence.

Environmental Characteristics:

Adsorption and leaching in basic soil types: Data gap
Microbial breakdown: N/A
Loss from photodecomposition and/or volatilization: N/A
Bioaccumulation: N/A
Resultant average persistance: As a naturally occurring substance, copper persists indefinitely.
Half-life in Water: N/A

Ecological characteristics:

Hazards to Birds: Minimal hazards
Hazards to Aquatic Invertebrates: Toxic to aquatic invertebrates.
Hazards to Fish: Toxic to fish. Field studies have been required.
Potential Problems with Endangered Species: Biological opinions from OES have stated that there may be hazards to the slackwater darter, freshwater mussels, and Solano grass. Statements will be required on all EP labels requiring the applicator to consult a specific Agency Bulletin before applying copper sulfate in certain counties.

Tolerance Reassessment:

List of crops and tolerances: Copper sulfate is exempted from all tolerances.
List of food contact uses: Copper sulfate is exempted from all tolerances.
Results of tolerance reassessment: Exemption was found to be valid.
Problems known to have occurred from use: No specific problems requiring regulatory action.

4. Summary of Regulatory Position and Rationale:

Use Classification: None
Use, Formulation or Geographic Restrictions: In certain counties, the user must consult a specific Agency Bulletin on endangered species before applying copper sulfate.

Unique Label warning statements:

a. Labels for manufacturing-use copper sulfate products must bear statements reflecting the compound's acute human toxicity. Copper sulfate is in Toxicity Category I by eye and dermal irritation routes of exposure.

The following human hazard statement, based on data reviewed by the Agency, must appear on all MP labels, and on the labels of all EPs in the 99% a.i. crystalline form:

"DANGER - Causes severe eye and skin irritation. Harmful if absorbed through the skin or inhaled. May cause skin sensitization reactions in certain individuals. Avoid contact with the skin, eyes, or clothing. Avoid breathing

dust. Protective clothing, including goggles, should be worn. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse."

One of the following statements of practical treatment, based on data reviewed by the Agency, must appear on all MP labels, and on the labels of all EPs in the 99% a.i. crystalline form, under a heading that reads either "Practical Treatment" or "First Aid":

"IF IN EYES, flush with plenty of water. Call a physician. IF ON SKIN, wash with plenty of soap and water. Get medical attention. IF SWALLOWED, call a physician or Poison Control Center. Drink 1 or 2 glasses of water and induce vomiting by touching the back of throat with finger. Do not induce vomiting or give anything by mouth to an unconscious person."; or

"IF IN EYES, flush with plenty of water. Call a physician. IF ON SKIN, wash with plenty of soap and water. Get medical attention. IF SWALLOWED, call a physician or Poison Control Center. Drink 1 or 2 glasses of water and induce vomiting by touching back of throat with finger, or, if available, by administering syrup of ipecac. Do not induce vomiting or give anything by mouth to an unconscious person."

b. The following revised environmental hazard statement must appear on all MP labels:

"This pesticide is toxic to fish and aquatic organisms. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or public water unless this product is specifically identified and addressed in an NPDES permit. Do not discharge effluent containing this product into sewer systems without previously notifying the sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA."

c. The following statements must appear on all EP labels:

i. "May cause skin sensitization in certain individuals"; and

ii. "ENDANGERED SPECIES RESTRICTIONS

It is a violation of Federal laws to use any pesticide in a manner that results in the death of an endangered species or adverse modification of their habitat.

The use of this product may pose a hazard to certain Federally designated endangered species known to occur in specific areas within the following counties:

STATE Species (Bulletin No.)	COUNTY
CALIFORNIA Solano Grass (EPA/ES-85-13)	Solano
TENNESSEE Slackwater Darter (EPA/ES-85-04)	Lawrence Wayne Hancock
Freshwater Mussels (EPA/ES-85-07)	Claiborne Hawkins Sullivan
ALABAMA Slackwater Darter (EPA/ES-85-05)	Lauderdale Limestone Madison
VIRGINIA Freshwater Mussels (EPA/ES-85-06)	Grayson Smyth Scott Lee Washington

Before using this product in the above counties you must obtain the EPA Bulletin specific to your area. This Bulletin identifies areas within these counties where the use of this pesticide is prohibited, unless specified otherwise. The EPA Bulletin is available from either your County Agricultural Extension Agent, the Endangered Species Specialist in your State Wildlife Agency Headquarters, or the appropriate Regional Office of the U.S. Fish and Wildlife Service. THIS BULLETIN MUST BE REVIEWED PRIOR TO PESTICIDE USE."

e. All copper sulfate products intended for direct application to water must bear the following statements:

i. "This pesticide is toxic to fish. Direct application of copper sulfate to water may effect a significant reduction in populations of aquatic invertebrates, plants and fish."

ii. "Do not treat more than one-half of lake or pond at one time in order to avoid depletion of oxygen from decaying vegetation. Allow 1 to 2 weeks between treatment for oxygen levels to recover."

iii. "Trout and other species of fish may be killed at application rates recommended on this label, especially in soft or acid waters. However, fish toxicity generally decreases when the hardness of water increases."

iv. "Do not contaminate water by cleaning of equipment or disposal of wastes."

v. "Consult your State Fish and Game Agency before applying this product to public waters. Permits may be required before treating such waters."

f. All copper sulfate products intended for end use applications to water where there is likelihood of effluent reaching natural waters, i.e. cooling towers, paper or pulp mills, spray ponds, sewer pumps, force mains, algicide and molluscicide uses, must bear the following statement:

"This pesticide is toxic to fish and aquatic organisms. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or public waters unless this product is specifically identified and addressed in an NPDES permit. Do not discharge effluent containing this product to sewer systems without previously notifying the sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA."

g. All copper sulfate products intended for end use on terrestrial sites must bear the following statement:

"This pesticide is toxic to fish and aquatic organisms. Do not apply directly to water. Drift and runoff from treated areas may be hazardous to fish and aquatic organisms in adjacent aquatic sites. Do not contaminate water by cleaning of equipment or disposal of wastes."

5. Summary of major data gaps:

Data Requirement:	Data Due Date:
Product Identity and Disclosure of Ingredients	6 months
Discussion of Formation of Impurities	6 months
Preliminary Analysis	12 months
Certification of Ingredient Limits	12 months
Analytical Methods and Data for Enforcement of Limits	12 months
Aerobic Soil Metabolism	27 months
Anaerobic Soil Metabolism	27 months
Anaerobic Aquatic Metabolism	27 months
Aerobic Aquatic Metabolism	27 months
Leaching and Adsorption/Desorption	12 months
Soil Dissipation - Field	27 months
Aquatic Dissipation - Field	27 months
Acute Toxicity to Freshwater Fish (on typical EP for Aquatic food and non-food uses)	9 months
Acute Toxicity to Freshwater Invertebrates (on typical EP for Aquatic food and non-food uses)	9 months
Acute Toxicity to Estuarine and Marine Organisms (on typical EP for Aquatic food and non-food uses)	12 months
Fish Early Life Stage	15 months
Invertebrate Life-Cycle	15 months
Field Testing - Aquatic Organisms	24-48 months

6. Contact person at EPA: Richard Mountfort TS-767-C
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DISCLAIMER: The information presented in this Chemical Information Fact Sheet is for informational purposes only and may not be used to fulfill data requirements for pesticide registration and reregistration.